

YOUR HEALTH

# Anatomy Of Addiction: How Heroin And Opioids Hijack The Brain

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FROM **nhpr**

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Jack O'Connor became addicted to opioids when he was a teenager.

*Greta Rybus for NPR*

When Jack O'Connor was 19, he was so desperate to beat his addictions to alcohol and opioids that he took a really rash step. He joined the Marines.

"This will fix me," O'Connor thought as he went to boot camp. "It better fix me or I'm screwed."

After 13 weeks of sobriety and exercise and discipline, O'Connor completed basic training, but he started using again immediately.

"Same thing," he says. "Percocet, like, off the street. Pills."

Percocet is the brand name for acetaminophen and oxycodone. Oxycodone is a powerful opioid. It's one of the most commonly prescribed painkillers, and is a key factor in one of the country's most pressing public health problems — an opioid addiction epidemic. It is a crisis that started, in part, from the overprescription of painkillers like Percocet, and then shifted to heroin as people addicted to prescription

drugs looked for a cheaper high.

O'Connor is one of an estimated 2.5 million Americans addicted to opioids and heroin, according to the National Institute on Drug Abuse. Over three years, he detoxed from prescription painkillers — and heroin — more than 20 times. Each time, he started using again. So why is it so hard for opioid addicts to quit? You can boil it down to two crucial bits of science: the powerful nature of opioids and the neuroscience behind how addiction hijacks the brain.

"The first recording of opioid use was 5,000 years ago," says Dr. Seddon Savage, an addiction and pain specialist at Dartmouth College. It was "a picture of the opium poppy and the words 'the joy plant.' "

### **'It Ruined Me That Time. But I Loved It'**

Jack O'Connor says he ended his freshman year of college as an alcoholic. He went home that summer desperate to replace alcohol with something else. And it was not hard to do. In 2012, 259 million opioid pain medication prescriptions were written — that's enough painkillers for every American to have a bottle of the pills. O'Connor got his hands on some 30-milligram Percocet.

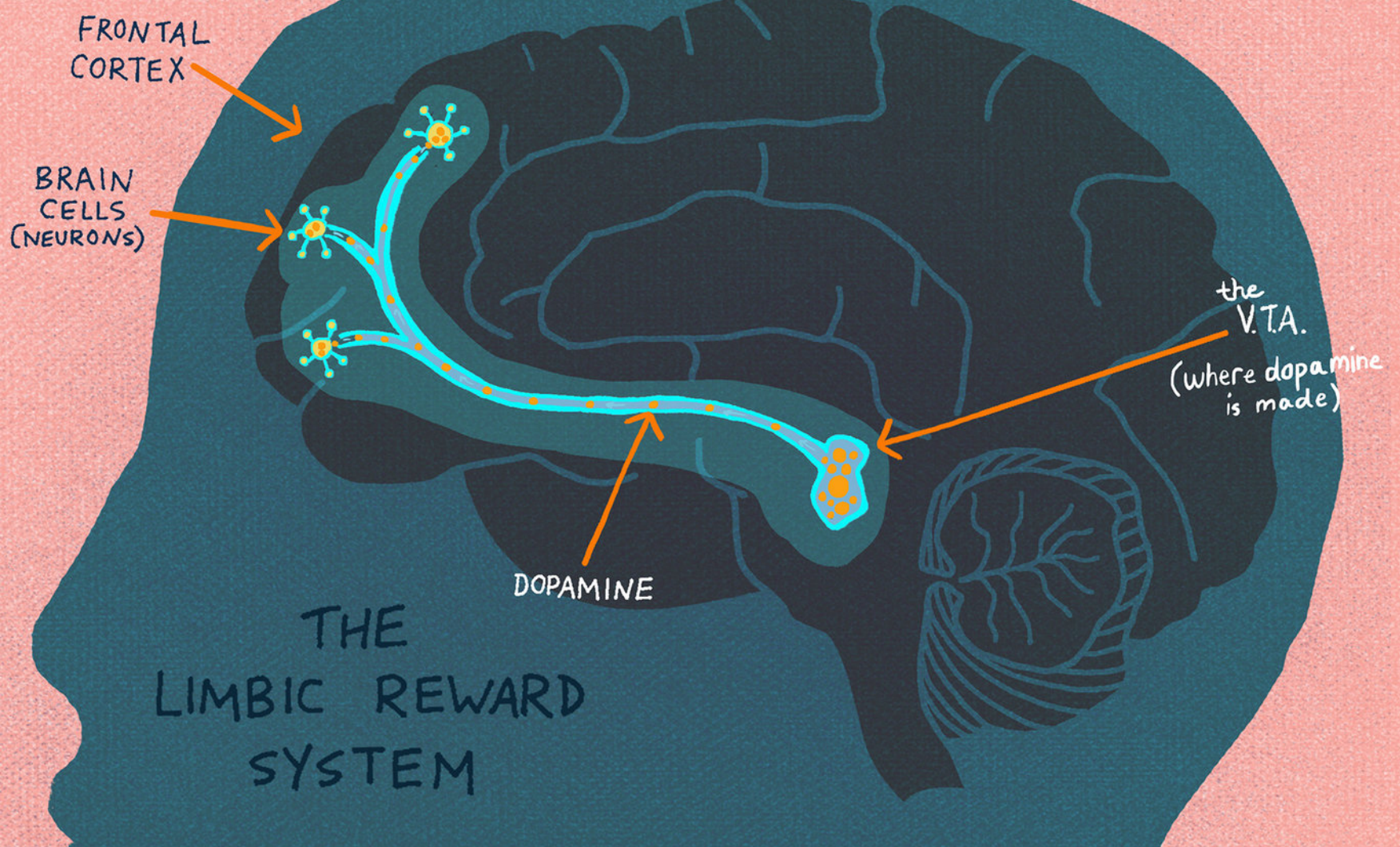
"I ended up sniffing a whole one, and I blacked out, puking everywhere," says O'Connor. "I don't remember anything. It ruined me that time. But I loved it."

Opioids got him higher faster than any drug he had tried. And even though different drugs produce different highs, they all involve the same pathway in the brain.

## How Opioid Addiction Works

Opioids increase the amount of dopamine in a part of the brain called the limbic reward system. Dopamine causes intense feelings of pleasure, which drives users to seek out the drug again and again.





LA Johnson/NPR

They trigger the release of dopamine, which is a neurotransmitter that causes intense pleasure in parts of the brain that include the limbic system, according to Savage. It links brain areas that control and regulate emotions such as the pleasures of eating, drinking and sex. "This is a very ancient part of the human brain that's necessary for survival," says Savage. "All drugs that people use to get high tickle this part of the brain."

People can become psychologically and physically dependent on opioids very quickly. Breaking the physical dependence involves a several-day nightmare called detox, when the body gets used to being without the drug.

"It is an amazing thing to see someone basically vibrating in their chair, feeling nauseated, looking like hell," says Jeffrey Ferguson, a detox specialist at Serenity Place in Manchester, N.H.

Jack O'Connor put himself through detox 20 times, but that didn't stop his addiction.



O'Connor's limbic reward system had hijacked other systems in his brain — systems that drive judgment, planning and organization — driving them all to seek that pleasure of getting high. This process can go on during years of sobriety, according to Savage.

"Addiction recruits memory systems, motivational systems, impairs inhibitory systems and continues to stimulate the drive to use," she says.

O'Connor says all his decisions began to serve his addiction. When he was using, everything was about getting the next drink or drug.

Over his years of addiction, O'Connor lied to his family and stole from his job — all while also trying to get sober. A little over a year ago, he put himself through a five-day detox clinic and managed to get through five more days in the real world sober. Then he couldn't take it. One day he started obsessively searching his credit cards for drug residue. He found a bag of heroin in his wallet.

"Somebody's telling me I need to get high," he thought at the time.

And that's what he did.

## **'I Don't Need It Anymore'**

Feelings like joy and shame also play a role in drug dependence, and make it hard to quit. Practical issues are a challenge, too. "Finding the job, saving money, finding a place to live," says Ferguson. "Maybe they have some felony convictions. It's a lot."

And the country is facing a shortage of addiction treatment facilities and specialists; the shortage ranges wildly from one state to another. Treatment for opioid addiction includes a variety of services: medication, talk therapy, job support, all stretched out over years. Detox isn't enough.

"For people who don't get intensive treatment, people who are just detoxified [from opioids]," says Savage, "relapse rates can be above 90 percent."



O'Connor has been sober for a year and now lives and works in a residential drug treatment program in Dover, N.H.

Greta Rybus for NPR

O'Connor is now 23 and he's finally sober — Jan. 11 is his one-year sobriety date. In that time he's been in a nonmedical residential treatment program in Dover, N.H., where he lives and works. He has support — a girlfriend, his family, the Marines. And in the same way that he once replaced his coping skills with drugs, he has rebuilt his coping skills around quitting drugs.

"I don't need it anymore," he says. "I literally, physically and emotionally don't need it." And as much as O'Connor loved the feeling of getting high on heroin, now there is something he loves more: "I love the way I feel sober," he says.

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